REMARKS

This amendment is responsive to the Office Action of May 19, 2005. Reconsideration and allowance of claims 1-18 are requested.

The Office Action

Claims 1-5, 6-7, and 12 are objected to under 37 CFR 1.75 as being duplicative.

Claims 1-18 stand rejected under 35 U.S.C. § 102 as being anticipated by Wood (US 2002/0070970).

Claim 19 stands rejected under 35 U.S.C. § 102 as being anticipated by He (US 6,275,562).

The Present Application

The present application addresses the problem of how to view an excessively large amount of CT data, such as the images from a whole body scan. A whole body scan, for example, may include a series of axial slices each a half millimeter thick. Over the length of an adult, this can generate on the order of 4,000 slice images.

The time required for a radiologist to analyze 4,000 images is very significant. To make the radiologist's job faster and more efficient, the present application proposes to combine subsets of these thin slice images together, into thick slices. For example, a first ten 0.5 mm thin slice images can be combined into a first 5 mm thick slice image; a second ten 0.5 mm thin slice images can be combined into a second 5 mm thick slice image; etc. In this example, the 4,000 0.5 mm slices are reduced to 400 5 mm images. Of course, slices of other thicknesses and combined in differently sized subsets are contemplated.

On the display, the thick slice image is displayed along with a representative one of the thin slice images. Note that if a center 0.5 mm thin slice image is displayed concurrently with the 5 mm thick slice image, the radiologist can discriminate abnormalities on the order of 2.5 mm or better.

The radiologist steps through the thick slice images. If one of the fixed slice images shows an abnormality or something of concern, or if the radiologist from

a priori knowledge of anatomy and physiology determines that the anatomical region corresponding to the displayed thick slice requires more detailed examination, then the radiologist clicks through the ten corresponding thin slice images in the outer viewing port.

The Wood Reference

First, in the next to last sentence of paragraph 6, Wood defines slice as the anatomical region of the patient and "axial section" as the image of that anatomical region or slice. During the telephone interview, Examiner Casler directed the applicant's attention to paragraph 9 for its discussion concerning adjacent sections. However, it is submitted that once it is understood that "axial section" is the same as "slice", paragraph 9 is merely stating that the slices should have a thickness which is less than or equal to the dimensions of the anatomical features to be detected. "Sections" in paragraph 9 are synonymous with "slices" and do not indicate a combination or summing of slices.

Looking to Figure 5, the display of Wood is divided into three sections. The main display section **510** displays an axial slice or section. The second display **520** is a volumetric view of the volume encompassed by the CT sections (or slices). Display **530** is a magnified and rotatable portion of part of the volume rendered second display. The second display **520** further has a horizontal line (not numbered) which is an edge or top view of the slice displayed in the first display **510**. In this manner, as one scrolls through slices on the display **510**, the line on the second display **520** shows the viewer where the slice displayed on **510** is located relative to the overall organ.

Wood is not precise in the nature of the "volume" image **520**. It appears that all of the axial images are stacked or aligned to define a three-dimensional grid of data values. It is from this three-dimensional or volumetric grid of data values that the "volume" image is derived. Paragraph [0045] indicates that the three-dimensional image **512** is a three-dimensional "rendering" of an organ or organ system. The volume image of Wood could be a "surface rendering" which is typically defined by the data points of the volumetric grid which define the surface of the organ. The gray scale of each display point is determined based on a surface normal of the

corresponding organ surface data point relative to a viewing direction and an illumination direction. That is, the surface rendered volume display depicts the exterior of the organ shaded to depict surface contour. On the other hand, a volume image could be a projection image analogous to a single exposure film x-ray, i.e., all of the data points from within the organ of interest projected orthotonal to the plan of the axial sections onto a single plane.

Other explanations may also be possible. Whatever the explanation of the volume image, it is clear from Figure 5 that the organ in the volume image is viewed from a direction orthogonal to the direction which the slice image in display **510** is viewed, because the slice viewed in display **510** shows up as a line in volume image **520**.

Examiner Roy directed the applicant's attention to paragraph [0064] and corresponding Figure 9C. Paragraph [0064] does disclose that the slice images in the first display could be thicker slices which have advantages of reduced artifacts, faster computational times, and faster scanning times. However, paragraph [0064] does not suggest combining thinner images to get the thicker images. Rather, paragraph [0064] suggests conducting a scan with thick slices for screening purposes. Then, if there are any nodules or areas of concern, the patient is rescanned in that region with a thin slice imaging protocol.

Thus, Wood specifically teaches that if one wants to view thick and thin slices, the slices should each be acquired in different scans, presumably with each scan optimized for the selected slice thickness.

The Claims Distinguish Patentably Over the References of Record

Claim 1 calls for a data processor which combines subsets of first image slices to generate a plurality of second image slices. First, the volume image **520** of Wood is not a slice image. Second, the volume image **520** of Wood is a single image, not a plurality of images. Third, the volume image of Wood is derived from a full set of slice images. Wood does not suggest generating plural volume images from plural subsets of the collected image data.

Moreover, claim 1 calls for each of the subsets which are combined into the second slice images to include a plural number of contiguous first slice images. Wood does not suggest combining sets of slice images **510** into second slice images.

Further, claim 1 calls for the first and second slice images to be parallel and to be viewed from the same direction. By contrast, the slice images **510** and the volume image **520** of Wood are viewed from orthogonal directions. Note that the slice image appears as a single line in the Wood volume image. The purpose of Wood's volume image is to help the evaluator determine where the displayed slice **510** is located in the organ. If the volume image were viewed from the same direction as the slice image, portions of the volume between the viewer and the slice would obscure the slice and longitudinal position along the image information would not be apparent.

Accordingly, it is submitted that **claim 1 and claims 2-5 dependent therefrom** distinguish patentably and unobviously over the references of record.

Claim 3 calls for the display to further include a third viewport which depicts a reference image which is viewed from a direction transverse to the first and second image slices. While the volume image **520** of Wood may meet the requirements of a reference image viewed from a direction transverse to the slice image **510**, if the volume image of Wood is interpreted as the reference image in the third viewport, then there is no second image slice in Wood. The third viewport **530** of Wood is an enlarged section of the reference image **520**. Accordingly, it is submitted that **claim 3 and claim 4 dependent therefrom** distinguish patentably and unobviously over Wood.

Claim 6 calls for obtaining a plurality of first slice images of a subject each corresponding to a first thickness. Claim 6 further calls for a combining means which generates a plurality of second slice images from combined subsets of the first slice images. The volume image **520** of Wood is a volume image, not a slice image: The volume image of Wood is a single image, not a plurality of slice images. The volume image of Wood appears to be derived from the data set as a whole, not a subset of contiguous slices.

Claim 6 also calls for displaying selected ones of the plurality of second images. Wood discloses a single volume image and makes no suggestion of a plurality of volume images which are selectively displayed.

Further, claim 6 calls for the displayed first and second image slices to be viewed from a common direction. The volume image (and the magnified volume image section) is viewed from a direction orthogonal to the slice image **510** of Wood.

Accordingly, it is submitted that **claim 6 and claims 7-14 dependent therefrom** distinguish patentably and unobviously over the references of record.

Claim 15 is directed to a method in which a plurality of second 2D images are generated from subsets of a plurality of first 2D images by merging subsets of contiguous first 2D images. Again, the single volume image **520** of Wood is not a plurality of 2D images.

Further, claim 15 calls for the second images to represent slices of a second thickness greater than a thickness of the first images. The volume image **520** of Wood is not a slice image.

Claim 15 further calls for displaying the second images sequentially. Wood does not suggest displaying a plurality of volume images **520** sequentially.

Accordingly, it is submitted that **claim 15 and claims 16-18 dependent therefrom** distinguish patentably and unobviously over the references of record.

Double-Patenting

Claim 6 is set forth in means-plus-function format. By contrast, claim 1 is not. Due to the difference in interpretation which courts commonly accord to means-plus-function and non-means-plus-function claims, it is submitted that claims 1 and 6 are not substantial duplicates and do not constitute double-patenting.

The Present Amendment Should be Entered

As set forth above, there are multiple reasons why each of the claims with or without the present amendment being entered are not anticipated by Wood. With the presently proposed amendments, the claims distinguish yet more clearly over Wood. Because this amendment places the claims of the application in condition for allowance, it is submitted that this amendment should be entered.

Interview Summary

The applicants thank Examiners Roy and Casler for the courtesy of a telephone interview of July 26, 2005. The interview focused on claim 1 and the Wood reference. The presently proposed amendments to the claims arose from the discussions as potential ways to distinguish the claims more clearly over the Wood reference.

The Examiner agreed to take the amendment under consideration, but would make no commitment regarding whether this amendment differentiates over Wood.

CONCLUSION

For the reasons set forth above, it is submitted that claims 1-18 distinguish patentably over the references of record and meet all statutory requirements. An early allowance of all claims is requested.

In the event the Examiner considers personal contact advantageous to the disposition of this cases, he is requested to telephone Thomas Kocovsky at (216) 861-5582.

Respectfully submitted,

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